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AUTHOR Peterson, Joe
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ABSTRACT

The predominant use of female teachers in the elementary school is one of the variables to which the inferior learning rates of males in elementary school has been attributed. The present study was designed to determine the effect of the sex of the teacher/experimenter on the learning of a reading-like paired associate task by children in two elementary school grades. A double blind design was used in the study. Sex of experimenter, sex of subject, and grade of subject were the independent variables in the study. The dependent variable was the total number of correct responses on the paired associate task specifically designed to resemble the act of learning to read. The data were analyzed by analysis of variance. A significant difference was found between learning rates of first and fifth grade subjects, but no significance was found in the different learning rates of: (1) boys and girls in the first grade; (2) boys and girls in the fifth grade; or (3) subjects of male and female experimenters. The sex of the teacher, per se, does not differentially affect the academic performance of boys and girls if both sexes are given equal opportunities to participate in instruction. (Author)

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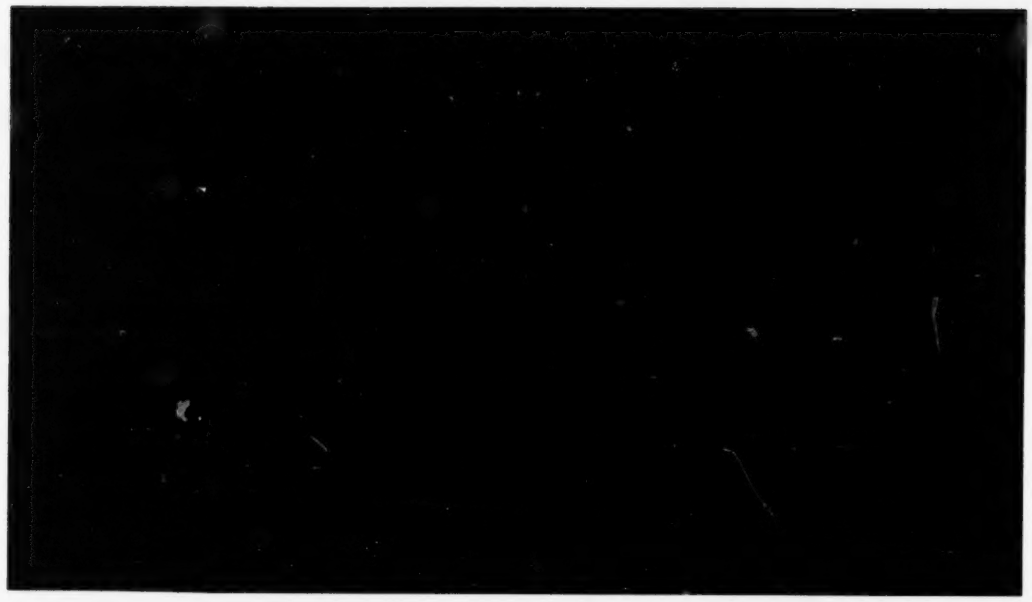

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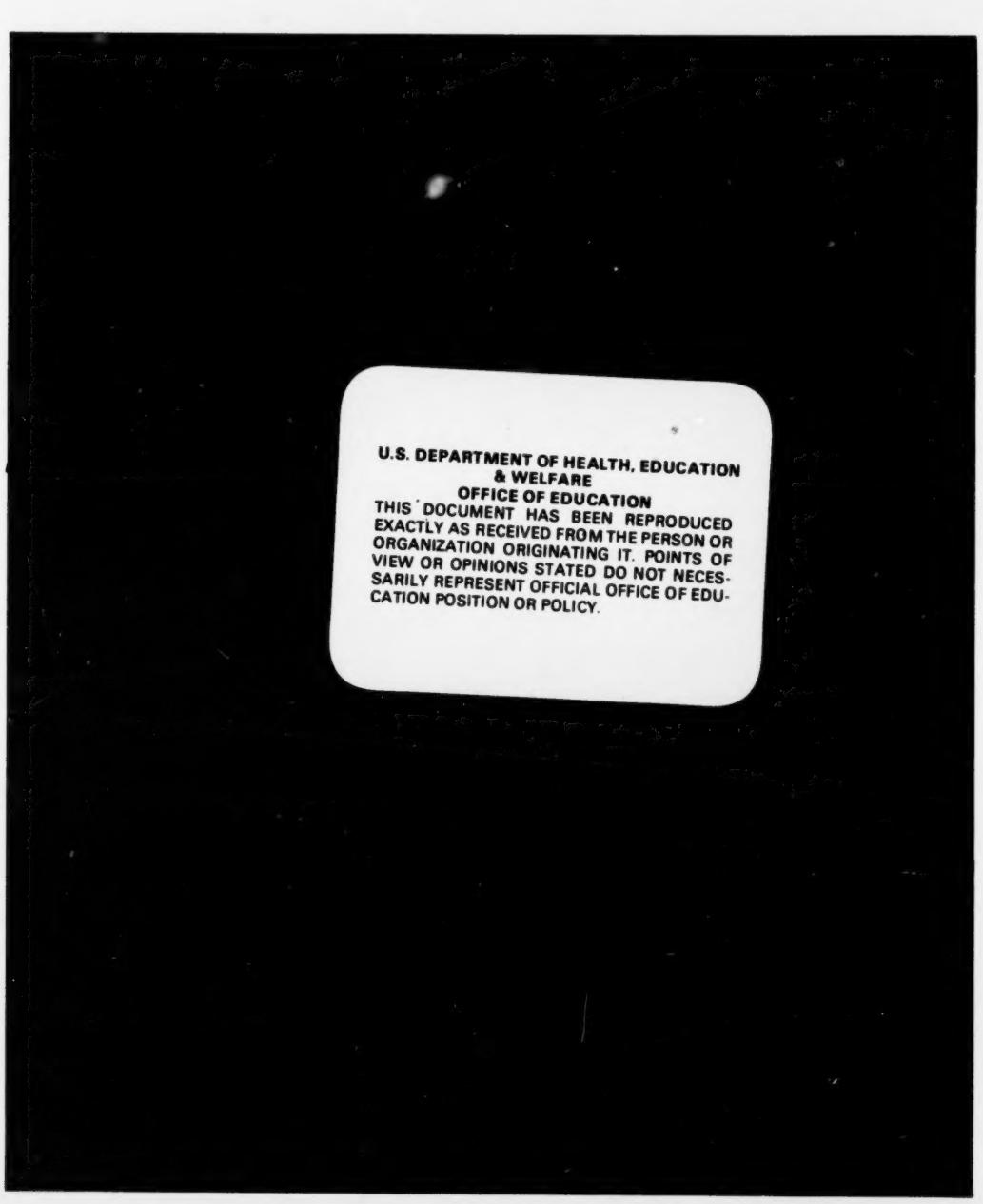
Prototypic System of Reading Skill Development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Report from the Project on Individually Guided Elementary Language Arts, Phase I.
Prototypic System of Reading Skill Development

By Joe Peterson

Wayne Otto, Professor of Curriculum and Instruction
Chairman of the Examining Committee and Principal Investigator

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
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June, 1970

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Statement of Focus

The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from the Individually Guided Instruction in Elementary Reading Project in Program 2. General objectives of the Program are to establish rationale and strategy for developing instructional systems, to identify sequences of concepts and cognitive skills, to identify or develop instructional materials associated with the concepts and cognitive skills, and to generate new knowledge about instructional procedures. Contributing to these Program objectives, the Reading Project staff, in cooperation with area teachers, prepared a scope and sequence statement of reading skills for the elementary school as a first step in the development of an instructional program. From this outline, assessment procedures and group placement tests have been developed, and existing instructional materials have been keyed to the outline. Research is conducted to refine the program and to generate new knowledge which will be incorporated into the system.

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ABSTRACT

The predominant use of female teachers in the elementary school is one of the variables to which the inferior learning rates of males in elementary school has been attributed. The implication is that male teachers in the elementary school would foster the academic growth of young males.

In lieu of male teachers at the primary level, the present study was designed to determine the effect of the sex of the teacher/experimenter on the learning of a reading-like paired associate task by children in two elementary school grades. Specifically, answers to the following questions were sought: (a) Will learning performance of boys and girls differ at either first grade or fifth grade? (b) Will the sex of the experimenter be a significant variable in the learning of boys and girls? (c) Will the sex of the experimenter interact with the sex of the subjects at either first or fifth grade?

A double blind design was used in the study. Six females and six males, all seniors majoring in education, served as experimenters. A total of 96 children were employed in the study, with equal numbers of boys and girls and first and fifth graders assigned to each experimenter. Sex of experimenter, sex of subject, and grade of subject, then, were the independent variables in the study.

The dependent variable was the total number of correct responses on the paired associate task specifically designed to resemble the act of learning to read. The task was based on six minimally similar, phonetically regular three letter concrete nouns spelled with 15 letters. These words, written in a whimsical alphabet, served as the stimuli in the task; the responses were the oral productions of the words. A scrambled order of presentation was used for each of eight learning trials.

The data were analyzed by analysis of variance. A significant difference was found between learning rates of first and fifth grade subjects, but no significance was found (a) in the different learning rates of boys and girls in first grade, (b) in the different learning rates of boys and girls in fifth grade, (c) in the different learning rates of subjects of male and female experimenters, or (d) in the three way interaction of sex of experimenter, sex of subject, and grade of subject.

The conditions of the experiment differ from the conditions in the classroom in several important respects, the most important of which appear to be the individual attention given to each learner and the length of the task. With these limitations in mind, a working hypothesis can be developed for the classroom: The sex of the teacher, *per se*, will not differentially affect the academic performance of boys and girls if both sexes are given equal opportunities to participate in instruction.

CHAPTER 1

SCOPE AND BACKGROUND OF THE STUDY

Nature and Purpose of the Study

That boys learn less well than girls in elementary school has long been documented. One of the reasons which has been suggested for this difference is that most primary grade teachers are women. The present study was undertaken to determine what different effects, if any, males have upon the learning of elementary school age children in a controlled learning situation. Specifically, two purposes were: (a) to consider the effect of the sex of experimenter upon the learning performance of elementary age children of two age levels in a reading-like paired associate task, and (b) to determine whether the different learning rates of boys and girls can be explained, in part, in terms of differences in performance due to an interaction of sex of teacher and sex of student.

The effect of the sex of the experimenter upon the nature of responses which have been made by subjects under conditions of reinforcement or of coercion has been examined in earlier studies. The dependent variables in most of

these studies have been performance of simple motor tasks or amount of attention seeking behavior. There has, however, been no systematic attempt to examine the learning performance of elementary school age children in a laboratory situation where the effect of the sex of the experimenter can be more effectively isolated. Satisfactory studies of the possible interaction of sex of teacher and sex of student have also not been done.

For these and other reasons which will be considered, the present study was undertaken. A reading-like paired associate task, in which subjects learned to read words written in a whimsical alphabet, was constructed especially for this study. A total of 12 naive experimenters were employed to administer the task to a total of 96 first and fifth grade pupils, with pupils and experimenters represented by equal numbers of each sex.

Contribution of the Study

The present study was designed to answer the following specific questions: (a) Will boys and girls in first grade learn at the same rate? (b) Will boys and girls in fifth grade learn at the same rate? (c) Will the sex of the experimenter make any difference in the learning rate of elementary school children? (d) Will there be an interaction between sex of experimenter and sex of subject at either first or fifth grade?

Learning has not been the focus of previous laboratory

studies on the effect of sex of experimenter and sex of subject. Further, only a very limited number of experimenters have been employed in some of these studies. Other studies of teachers in the classroom have been faulted because of inadequate designs and controls. The present study has been designed to overcome these limitations.

Related Research and Rationale for Certain Aspects of the Present Study

This review of research is limited to two major areas: (a) the differential achievement of boys and girls in elementary school, particularly in reading, and to one of the possible causes of differential achievement, the sex of the teacher; and (b) differential effects of experimenters' sex on the outcome of experiments. The review is not exhaustive; studies have been chosen because of their relevancy to the problem and because of their general acceptance in the many reviews of boy-girl differences in achievement in elementary school.

A rationale for certain aspects of the present study is presented along with and in addition to the reviews of related studies. The studies are reviewed in the order listed above.

Sex Differences in Academic Achievement

The studies reported here are arranged as follows: (a) historically, to show the persistence of sex differences in general achievement, (b) chronologically, from grade

level to grade level, most often in the area of reading, and (c) in a causal sense, to show inferred and observed differential treatment of children by male and female teachers.

One of the first studies usually cited in reviews of sex differences in education is found in Ayres' (1909) book, Laggards in Our Schools. Lacking sophisticated statistical techniques, standardized test results, or even the actual number of non-promotions, he nevertheless arrived at some interesting conclusions about conditions in the schools at that time. From the ages of the children in the schools he was able to infer the incidence of non-promotion. According to the figures reported, 12.8% more boys than girls repeated grades and 17.2% more girls than boys completed eighth grade. Although some of this inferred non-promotion could be due to factors other than non-promotion, it is interesting to note that the figures upon which these conclusions were based showed a slightly greater number of boys than girls enrolled in elementary school and greater numbers of girls only in grades six, seven, and eight. Whether or not excessive repeating of grades by males can be inferred from Ayres' data, at the very least it can be inferred that societal pressures demanded that boys be older in the primary grades and perhaps that less schooling was expected of boys.

The reason which Ayres gives as the cause for finding

overage, non-promoted boys in the elementary school is related to one of the basic questions of this study and indicates a historical precedent for what had been presumed to be a uniquely modern interpretation - i.e., the predominantly feminine direction of the education process. Indeed, Ayres shows that the thought was not original with him.

> In the current discussion of what has been termed the feminization of our schools, much has been made of alleged bad effects of too exclusively feminine instruction on the moral fiber and character of the boys, but little evidence has been brought forward to substantiate these claims (Ayres, 1909, p. 157).

He did not feel, however, that his data substantiated the feelings of his time:

> It is impossible definitely to attribute these conditions to the employment of large numbers of women teachers in our schools because we have no schools taught by men to use for purposes of comparison. We can, however, state definitely as a conclusion from the facts that have been presented, that our schools as they now exist are better fitted to the needs and natures of the girl than of the boy pupils (Ayres, 1909, pp. 157-8).

Later in the century, however, St. John (1932) presented a four year study of nearly 1,000 pupils with more sophisticated sources of data than Ayres had. He used standardized test results and teachers' grades as indications of performance and intelligence test scores as controls. With these factors he observed the achievement levels of children as they progressed through the first four years of school. His salient findings seemed to confirm

the conclusion reached by Ayres, that boys repeated more grades in school than girls, and the hypothesis accepted during that time, that the feminization of the schools was at least a partial cause of this problem.

A closer look at St. John's study seems warranted. He obtained objective data from standardized arithmetic, reading, and intelligence tests. Subjective data, upon which promotion or non-promotion of the children depended, included teachers' grades in reading, arithmetic, conduct, effort, and the average of all subjects, and such gross measures as retention, promotion, grade skipping, and referral to special classes. Under almost all conditions girls were found to be in advantageous positions, one exception being that boys skipped grades with lower levels of achievement than girls. In arithmetic the slight advantage of the girls as measured by the achievement test paralleled their slight advantage in measured intelligence. In other areas, however, boys were shown (a) to achieve less well in reading, (b) to be retained more often, (c) to be referred to special classes more often, and (d) to receive lower marks in reading, effort, conduct, and the average of all of their classes. Comparisons of varying combinations of intelligence, academic grades, achievement, and grades in effort and conduct revealed that undue weight was given to the factors of effort and conduct in grading boys. The discrepancy between achievement as measured by standardized tests and achievement

as measured by teachers' marks indicates that teachers tended to overestimate the superiority of girls. These are the critical factors which led St. John to write:

> the consistent inferiority of the boys in school progress and achievement is due chiefly to a maladjustment between the boys and their teachers which is the result of interests, attitudes, habits, and general behavior tendencies of the boys to which the teachers (<u>all women</u>) fail to adjust themselves and their school procedures as well as they do to the personality traits of girls. It would be expected that such a maladjustment would lower the achievement level...(St. John, 1932, p. 668).

However, at this point it is the differences in levels of achievement to which attention is drawn; causes will be explored at a later point.

The differences in achievement which St. John found with his two standardized tests were documented again ten years later. Stroud and Lindquist (1942) sampled data from more than 50,000 children in grades three through eight on the Iowa Every-Pupil Test of Basic Skills. They duplicated St. John's finding of no apparent differences in arithmetic; however, the slight advantage in this case was with the boys. In tests of reading comprehension, vocabulary, word study skills, and basic language skills, significant differences were found favoring girls. Since their data also revealed that boys did better in high school in the areas of science while girls maintained their broad superiority in the above mentioned language skills, the authors maintained that achievement follows lines of interest

rather than the lines of oppression and maladjustment as claimed by St. John and others. This does not appear to be saying anything different from St. John, however; the fact, as presented by Stroud and Lindquist, remains that elementary schools at the primary level emphasize areas in which young males are not interested. In the broadest sense of the term, a maladjustment would appear to be existing between the interests of the young boys and the emphases of the average primary school curriculum.

The data which were obtained on the Iowa Tests showing that girls maintained a superiority over boys in general language skills were not, however, consistent in all of the language skills. In reading comprehension, specifically with grades three through eight, the girls' superiority decreased with increasing age. At grade four the raw score differences were the greatest of the six grade levels compared, and the difference, though still favoring girls, tended to diminish with each succeeding grade level. After grade six the differences were no longer significant. Table 1 summarizes these data.

Studies which have been limited to sex differences in reading achievement tend to demonstrate differences between boys and girls in much the same manner as the two previous studies. Whereas sex differences in early elementary school have been revealed in most studies of sex differences in reading, only rarely have these sex differences been shown

TABLE 1

RAW SCORE MEAN DIFFERENCES FAVORING GIRLS IN READING COMPREHENSION AS MEASURED BY THE IOWA EVERY-PUPIL TEST OF BASIC SKILLS

Grade	Mean Differences	Significance Ratios
3	2.12	2.57
4	2.75	3.38
5	1.29	1.77
6	.30	.39
7	.10	.14
8	.47	.50

(Stroud and Lindquist, 1942, p. 664)

to persist in all elementary grades; the remainder of this section is concerned with some of the studies which are frequently cited and cataloged in standard reference works.

In the same year as the Stroud and Lindquist study, Alden, Sullivan, and Durrell (1942) gathered data on the reading abilities of over 6,000 children in grades two through six. They used one year's discrepancy between the two parts of the Durrell-Sullivan Capacity Test as a minimum criterion for judging retardation in reading. One of their findings was that boys outnumbered girls in this category by odds of about two to one in grades two through five, but the proportion declined to approximately seven to five in grade six.

Jackson (1944), in an attempt to discover whether differences existed between good and poor readers on psychological, social, or environmental factors, selected

300 poor and 300 good readers in grades two through six who scored, respectively, in the first and fourth quartiles on standardized reading tests. A gross division of groups into boys and girls inclusive of the five grade placements revealed that boys constituted 41% of the good readers and 63% of the poor readers. These differences were reported to be statistically significant.

Client loads of educational and psycho-educational clinics exhibit much the same picture. Using number of cases referred and diagnosed as having reading problems as the criterion, one can deduce from the figures that boys have more problems in reading than do girls. The percentage of boys in the total client loads of clinics varies from a low of approximately 65% (Fabian, 1955) to a high of approximately 90% (Young, 1938). More recently, Wyatt (1966) reported the percentage of boys in clinical populations varied from 75% to 90%.

Hughes (1953) provided grade by grade comparisons of 609 boys' and girls' reading comprehension scores on the Chicago Reading Tests. Her findings tended to parallel those of Alden, et al. (1942), and Stroud and Lindquist (1942) in that differences were found favoring girls at all grade levels but by different margins. At grade three, the difference of one-half year was significant at the .01 level of confidence; at grade four, the difference was significant only at the .05 level; and at grades five through eight the differences

did not reach significance.

A random sampling of almost 1,200 third and sixth grade children from 121 different elementary schools revealed much the same trend. Wozencraft (1967) provided data on these youngsters broken down into high, middle, and low ability groups according to the probable learning rate scores of the pupils. Her major findings were that the sex differences in reading diminished as children became older, and that for either age the differences between high learning ability boys and girls were less than those differences between average and slow learning boys and girls. Indeed, although the differences did not begin to reach significance, boys at the high ability level attained slightly higher grade equivalent scores than did the girls. Although the group differences between the sexes were significant at both grades, the difference at the third grade was wider than the difference at sixth grade and reached significance at .01 rather than .05.

A different pattern of results was obtained in a study by Gates (1961) which involved a greater number of children in grades two through eight. Using his own Survey as the instrument for measuring the reading achievement of over 13,000 pupils, he found that girls consistently scored higher than boys at all grade levels. Breaking the test into its three component parts - speed, vocabulary, and comprehension - he was able to make 21 comparisons

of mean raw scores, 17 of which reached significance at the .05 level. The remaining four comparisons were so close to reaching significance that they could have been dismissed as type II errors. Gates, however, pointed out that two of the four non-significant differences occurred at grade two where the tests were considered so difficult that he did not recommend them for use. The other two cases of non-significance occurred on the speed of reading test at grade three and at grade eight. These cases of non-significance may also have been due to the test reaching the outer limits of its range. The consistency of the girls' superiority at all ages suggested to Gates that maturational factors were not involved. Likewise, hereditary factors were ruled out because the distribution of achievement scores differed significantly from non-reading intelligence scores. However, Gates suggested that environmental pressures may have accounted for these differences.

The differences which Gates failed to find statistically significant at grade two seem to be apparent in a study by Fabian (1955) although the method of comparison differed. Of 200 second graders who were tested on the Metropolitan Achievement Test at the end of the school year, 20, who had neither low IQ nor a history of interrupted schooling, were found to be one-half year or more retarded in reading. Of these 20, 19 were boys.

At the first grade level, the Cooperative First

Grade Studies of 1964-65, although not intended primarily as studies of sex differences, did yield some information on this aspect of learning to read. Heilman (1967) reported that 27 separate designs went into the make-up of the 27 cooperative studies, accounting for the fact that only 13 of the 27 reported any comparisons of boys' and girls' reading achievement. These 13 studies were not summarized by Heilman in such a way as to present data which were compatible and exact. Therefore, the results which are presented here represent minimum numbers of comparisons made; it is possible that more than were explicitly reported by Heilman were made. Since these results are intended to indicate a trend, it is felt that such minimal figures will suffice. Out of a minimum of 57 comparisons of boys' and girls' achievement on the five reading subtests of the Stanford Achievement Test, a minimum of 24 of the comparisons showed significant differences favoring girls. There were no significant differences favoring boys, and no more than four of the non-significant differences favored them.

The causes for these sex differences are not clear. As previously mentioned, Gates, St. John, and Ayres are among those who feel that environmental pressures create the situation wherein boys do not achieve as well as girls. Although some of their theories indicate that the schools and female teachers as the agents of environment are responsible, the data presented so far do not substantiate this notion. Data pertinent to this issue are now considered.

Prescott (1955) reported an analysis of the data he obtained in norming the Metropolitan Readiness Test. Nearly 15,000 first grade pupils were tested in the project, more than half of whom were boys. Since the boys were significantly older than the girls, Prescott eliminated overage children to equate boys' ages with that of girls. With age thus held constant, girls scored significantly higher on the test. With overage children, this finding was not duplicated. Boys were found to have scored significantly higher than girls.

Although his interest in this data was merely to show that providing separate norms for boys and girls was not a practical suggestion, he did present data which could be interpreted as reinforcing the hypothesis of Ayres, St. John, and others that the schools were failing to adjust to the needs of young males. The finding of a significantly greater age among the males which was reduced by removing overage boys provided him with the same type of surplus population as Ayres' "retarded" children and St. John's non-promoted pupils. Further, his finding that overage boys scored significantly higher on the readiness test than overage girls tends to suggest that factors extraneous to achievement contributed to the non-promotion of these pupils. It would appear that a maladjustment may have existed between teacher and male pupil.

Further suggestion of differential treatment of boys and girls is evident in a study by Nila (1953). She found some 300 entering first grade boys and girls to be equally ready to learn to read on the basis of various group and individual readiness tests. After nearly a year of instruction, however, sex differences began to appear. Of 72 pupils who were designated as reading failures, 45, or 63%, were boys. To the extent that the readiness tests can be assumed to predict equally well for either sex, a point which is considered next, it can be inferred that the learning environment is much more supportive of success for girls than for boys.

Giving credence to the argument that maladjustment exists between boys and the schools is a study by Palardy (1969) which demonstrated that differential academic growth of boys and girls can be predicted from teachers' beliefs concerning sex differences. Restricting his first grade population to children who scored average or above on a prereading test, he found that teachers who expected boys to achieve as well as girls had just that happen in their classrooms, whereas those who expected boys to do less well than girls had these beliefs fulfilled. The implications are clear. Not only are the readiness tests shown to predict equally well for both sexes, but with children scoring average or above on readiness tests, boys can be taught to read as well as girls if they are

given the chance.

A classic study by Preston (1962) is frequently cited in reviews of sex differences in learning when the intent is to prove that a maladjustment exists between the schools, which are predominantly run by women, and young males. His study was a cross-cultural one, comparing the achievement in reading of fourth and sixth grade American and German children. Several complications prevented him from making judgments about who the better readers were, mainly the differences in the structures of the schools of the two countries and the difficulty in providing translations of standardized tests of comparable levels of difficulty. He did, however, find American girls superior to American boys at both grade levels with quite the opposite true of German youngsters: Boys were the better readers and girls exhibited greater frequency of reading disability and the more extreme cases of reading pathology. Since one of the more visible differences between German and American schools is the predominance of female teachers in American schools and the predominance of male teachers, even at the elementary level, in German schools, this phenomenon is often cited as the manifestation of the cultural factors which cause this reversal of sex differences. To many American educators and lay people, this has been translated to mean that young male students need male teachers.

Frequently coupled with the Preston study to strengthen the indictment of American female elementary teachers is a

study of programed instruction by McNeil (1964). In this study 132 kindergarten children were introduced to the act of reading with use of an auto-instructional device which included mechanical audio, visual, and response components for each of the children. A little over three weeks were spent in teaching 40 words to the pupils. The criterion test following instruction found the boys to have significantly better mastery of the 40 words than the girls. A year later, the same group was observed in first grade receiving traditional instruction by female teachers. The same type of criterion test, based on words the teachers had taught, revealed that the superiority had switched: Girls knew significantly more words than boys.

It has been documented that differences do exist between boys and girls in reading achievement in the elementary grades and some of the conditions under which they occur have been shown. The hypothesis which has been considered as one of the causes of these differences is that cultural pressures, sometimes defined as feminization, are transmitted in the school by way of the teachers who are usually women. It is not presumed that the sex differences that do exist exist for any one simple reason. The studies which have been cited have been cited to provide a rationale for looking at one of the possible sources, the effect of sex of the teacher/experimenter in a learning task.

A consistent pattern of sex differences throughout the elementary years has not been found in the literature. With the exception of results reported by Gates, however, the literature seems to suggest that sex differences in reading ability appear around the time that youngsters come into contact with reading instruction by female teachers. As the children progress through the grades this difference diminishes so that by the time they complete elementary school, the achievement level of boys as a group tends to be more nearly equal to that of the girls.

A few studies of the influence of adult males in the elementary classrooms have been reported. Probably due to the lack of male teachers in the primary years, no studies have been found which have spanned the grades usually found in elementary school. The studies which have been located that deal with the effect of the sex of the teacher will now be briefly discussed.

McFarland (1966) studied the impact of male participation in first grade instruction. The population which he studied included 55 first grade pupils who received instruction in the laboratory schools of two Kansas colleges. The classes were both under the direction of female teachers with participation in instruction by junior elementary education majors. One teacher, and hence one group of pupils, was assisted solely by male participants, the other by female participants.

Analysis of the findings revealed that the group which received instruction by the female supervisor and the male participants did not do as well as the group which received instruction from only females in the areas of arithmetic, reading, and personality gains. The differences did not reach significance in the area of reading. When data were analyzed according to student sex, boys who received instruction with male participation were shown to do better, though not significantly so, than girls under the same condition.

The probable causes of these findings are not entirely clear. However, a likely explanation exists. Since both classes were taught by female teachers, the influence of males was limited to a clearly subservient role even though two males were in attendance in the classroom at all times. Further clarification of the effect of the male in the instruction of primary age children is needed for the additional reason that it is not known whether both classes were under the supervision of both of the female senior teachers. The critical factor influencing the results could, therefore, be that of the relative efficiency of the two supervising teachers.

Studies of the effects of male teaching in the intermediate grades have not been clear nor have they been comprehensive. Tolbert (1966) used direct observation of 30 men and women teachers of grades four, five, and

six. Out of 19 hypotheses which were tested, no significant differences were found in 16 areas of teacher performance and effectiveness. Two differences which existed favored women on voice control and use of community resources and one favored men on the support of play and physical activities. The major conclusion was that there was no reason for school personnel officials to discriminate against the female teacher at this level. Bennett (1966) involved 547 fifth grade pupils from the classrooms of 15 male teachers and 16 female teachers and tested a total of 162 hypotheses, utilizing all possible combinations of the following in the hypotheses; sex of student, sex of teacher, normal or deprived homes, and the nine Stanford Achievement Test subtests. Only six of these hypotheses were found to be significant at the .05 level of confidence. The trend, if any can be said to exist, favors the girls under female teachers. Arnold (1968) reported a study in which 48 comparisons of marks of boys and girls by male and female teachers were made possible by dividing fifth and sixth grade youngsters by sex into high and middle socioeconomic backgrounds and high, middle, and low achievement levels within the socioeconomic background. Five differences were found to be significant. Three of these five involved men giving higher marks to three groups of girl pupils than to the same type of boy pupils and the other two involved separate groups of boys receiving higher marks than

the same type of girls, once with female teachers and once with male teachers. These differences do not seem to be educationally significant; they follow no discernable patterns and offer no bases for suggestion.

The mixed results of the above studies are not markedly different from the results of surveys in which the gap between the sexes in reading achievement has been shown to diminish toward the end of elementary school; by the later grades it appears that young males are either able to cope with female teachers or are expected to perform as well as girls and receive more nearly equal treatment. Likewise, the study of the influence of males upon the learning of first grade pupils is not necessarily at conflict with the general showing of sex differences in beginning reading. As mentioned above, the influence of males upon the learning of primary age children may have been different if the male was not in a subservient position.

Sex Interaction in Experiments

Perhaps the greatest amount of research on the effect of the experimenter in behavioral research has been done by Rosenthal. Although he has done little work on the role of sex of experimenter, his general research and syntheses of research results of experimenter effects led him to suggest that a "double-blind" (Rosenthal, 1966) design, i.e., where experimenters and subjects are naive

to the purpose of the study, is appropriate especially to those studies which are looking at effects of experimenters.

Concerning the effect of the sex of experimenter, Rosenthal comments:

> A good deal of research has been conducted which shows that male and female experimenters sometimes obtain significantly different data from their subjects. It is not always possible to predict for any given type of experiment just how subjects' responses will be affected by the experimenters' sex, if indeed there is any effect at all (Rosenthal, 1966, p. 42).

His survey of literature on the subject of sex differences included some quite widely varied experiments which could partially account for the differing results which were obtained. In the same survey of research are found experiments dealing with verbal learning, motor performance, hostility, coercion and reinforcement while adult examiners of different numbers interacted with children of various ages or with adults. It might have been expected that non-predictable results would occur from different combinations of these variables. Where only one experimenter of either sex had been employed, factors other than sex of the experimenter may not have been effectively partialed out, thus contributing to the nebulous results. The present survey is limited to those experiments which deal with children or children and verbal learning.

The effect of male and female experimenters on the lever pulling activity of two age groups of children was

reported in an unpublished manuscript of Stevenson and Odom (1963) and later summarized by Rosenthal (1966). Two male and two female experimenters obtained baseline data on the number of times 6-7 and 10-11 year old subjects would pull a lever in one minute, the intent of the experimenters being to determine the reward value of showing various pictures on a filmstrip. In determining baseline data, the experimenters left the room after the subjects had been introduced to the task. Even with this restraint, subjects who were initiated into this activity by male experimenters pulled the lever 30% more often ($p. < .001$). Rosenthal did not report whether there was any interaction between sex of experimenter and sex of subject nor what effect the reinforcement had upon subsequent performance.

These findings, however, were not completely replicated in an experiment by Stabler (1967). Two experimenters, one male and one female, were employed to determine children's responses to authority. Baseline data on the number of times two age groups of children, 3-5 years and 10-11 years, depressed the plunger of a standard hand counter did not reveal any differences due to sex of experimenter. Response to the command to keep pressing, i.e., coercion, revealed the older children were more responsive to the commands of the male than of the female and that elementary school age boys receiving commands from the male experimenter were the main contributors to this effect. With preschool

age children there were no effects due to the sex of either experimenter or subject.

These seemingly contradictory findings, however, are preceded by some methodological differences which may partially explain the discrepancy. First, Stabler employed only two examiners while Stevenson and Odom employed four. To suppose that one male and one female in Stabler's experiment could effect a composite experimenter-subject personal interaction for each sex was questionable. It would seem quite likely that personal characteristics quite unrelated to sex of the experimenters would at least contribute to the results obtained.

A second consideration is the type of task performed and the manner in which the directions to the task were perceived by the subjects. It is not unlikely that the perfunctory directions given by the examiners in the Stevenson-Odom study before they left the room were perceived as coercive statements by the subjects. If this be so, baseline conditions in this experiment could be expected to produce data similar to those in Stabler's condition of coercion.

In a closely related experiment, Stevenson, Keen, and Knights (1963) showed that 3-5 year old nursery school pupils who were instructed by males to drop marbles through holes performed better during the first minute than those who were instructed by female experimenters. After this

baseline data had been collected, experimenters began to compliment the pupils over a five minute period according to a standardized procedure. Subjects of male experimenters showed a mean decrement in performance compared to the first minute and subjects of female experimenters showed a mean increment in performance. Analysis of total responses made in all six minutes revealed no differences due to sex of experimenter, although girl subjects made more total responses than boy subjects.

The explanation given for initially better performance and subsequent decrement in performance when supportive statements were initiated by male experimenters was as follows. The relative absence of adult males in a nursery school setting, a self evident phenomenon, and the assumed lack of extensive adult male interaction with children of this age was believed to create anxiety among the youngsters when in the presence of a male which may have motivated them to higher productivity during the first minute of activity. The decrease in performance, then, was felt to have happened as a result of children feeling the supportive statements to be tension reducing, thereby allowing a relaxed pace.

A more extensive study of this problem (Stevenson, 1961), which shares a portion of its data with the above study, would seem on the surface to support the charge by Ayres and St. John that the excessively female teacher

dominated school does do something to retard the academic development of boys. Although most studies of achievement show boys to do less well than girls, this study by Stevenson revealed that the effectiveness of social reinforcement by women on a marble sorting task was significantly greater for boys than for girls at the 6-7 year level. The explanation of these phenomena by Stevenson was again based on the social deprivation model and suggested that these boys were more deprived of social reinforcement by women than were girls. To the extent that these results are generalizable to a learning situation, boys could be said to learn at least as well as girls at this age level if they receive equal amounts of social reinforcement.

Gewirtz (1954) provides additional support for this theory. When children of nursery school age were permitted to paint in the presence of an ostensibly busy adult, opposite sex pairing of adult and child produced the most bids for attention. A few years later, Gewirtz and Baer (1958) studied the effectiveness of social reinforcement on behavior with nursery school age children. The findings were the same: Opposite sex pairings again produced the most productive combination.

Hypotheses Tested

The research reviewed shows that boys and girls generally learn at different rates. Much of the research

which has been reviewed has shown boys to be slower in development than girls, starting out at a slower pace but tending to close the gap by the end of elementary school. Many explanations have been presented for this difference in achievement. The studies which have been cited in this review lead to the conclusion that one of the causes is the teacher in the classroom. McNeil (1964), for example, showed that boys who were instructed on a programed learning device learned significantly better than girls. After having been instructed by a female teacher, however, the roles were reversed: Girls' learning was superior to boys.

When the results of McNeil's experiment are compared with the results of an experiment by Preston (1962), it seems defensible to conclude that at least one of the factors causing inferior learning by boys is the sex of the teacher. Preston attempted to find whether German or American youngsters were the better readers. Whereas the results and conclusions on this question are tenuous, two related issues are generally felt to be important: (a) in Germany, girls experience more difficulties in learning to read than do boys; and (b) most teachers in Germany are men.

While the reasoning may be shallow, it has been relatively popular to suggest that male teachers in the primary school would aid in the learning of young males. No studies, however, have been found which have been focused specifically on the results of such a system. The present

study was designed to investigate what different type of influence, if any, males have on the learning of first and fifth grade boys and girls. In order to substantiate the argument that male teachers are at least part of a solution to the matter of inferior learning on the part of first grade boys, the data will have to show boys acquiring a smaller number of correct responses than girls on a learning task when under the tutelage of a female experimenter and a narrowing of the gap when under the tutelage of a male experimenter. Since sex differences in learning to read sometimes disappear as the children approach the end of elementary school, the implication is that the sex of the experimenter will have no effect on learning performance of the fifth grade children.

However, experiments designed to show the effect of the sex of the experimenter on performance of children yielded results which conflict with the above predictions. In experiments on the effect of reinforcement, Stevenson and Odom (1963) found that the number of times children of 6-7 and 10-11 years of age would pull a lever with one command was influenced by the sex of the experimenter. Children produced 30% more responses when the experimenter was a male. Stevenson, Keen, and Knights (1963), however, showed that the effectiveness of reinforcement on a marble sorting task of 3-4 year old children was affected by the sex of the experimenter in a quite different way. Females

were found to be the better reinforcers. Men, however, were found to get 18% better baseline data. In yet another study of reinforcement, Stevenson (1961) found a tendency for men to be the better reinforcers at the 9-10 year old level, and a further, less significant, tendency for men to be better reinforcers of girls and women to be better reinforcers of boys. At the same time, Stabler (1967) found that coercion induced by a male experimenter was more effective in sustaining plunger pushing on a hand counter with 10-11 year old males than with same age females, and that coercive commands given by a male were more productive than those given by a female. With children 3-5 years old, male and female experimenter were equally effective.

From these studies the prediction of the outcome of a learning situation is not possible. If conditions of no reward persist with first graders, male experimenters might tend to obtain a higher level of learning efficiency than female experimenters. Under conditions of reinforcement, however, male and female experimenters might be expected to obtain similar overall results or obtain better results with opposite sex pairings and probably equal efficiency across sex of subject.

Because the predictions which can be made from these two backgrounds are not unequivocal, neutral predictions are presented in the form of null hypotheses.

The specific hypotheses tested are as follows:

1. At first grade level, girls' paired associate learning will not be significantly different from boys' paired associate learning.

2. At fifth grade level, girls' paired associate learning will not be significantly different from boys' paired associate learning.

3. Sex of experimenter will have no significant effect upon the paired associate learning of boys and girls.

4. There will be no significant interaction between sex of subject and sex of experimenter at either first or fifth grade level.

CHAPTER II

METHOD

Three independent variables were studied: Sex of experimenter, sex of subject, and grade placement of subject, grade one and grade five. Twelve experimenters, six of each sex, were employed in the study, resulting in a four factor 2x2x2x6 design with the fourth factor, experimenter, nested within experimenter sex. Two subjects were assigned to each cell, making a total of 96 subjects.

The dependent variable was the performance score (total associations correct) on the paired associate task.

Subjects

Prior to the experiment, 26 subjects were employed in order to refine the paired associate task, establish directions, and determine the order of presentation of the stimuli. These preliminary subjects were chosen at random from the Sauk-Prairie, Wisconsin, Public Schools.

Subjects for the experiment were chosen from the two public elementary schools within the city limits of Whitewater, Wisconsin. The combined enrollment of the two schools is approximately 1,000 pupils. The schools

serve a community of 6,380 (1960 census) which includes the professional people affiliated with a university of almost 9,000 students. The pupils in the two elementary schools did not appear to differ markedly from each other in such factors as income, national origin or cultural background.

The subjects were chosen at random from pools of first and fifth grade boys and girls and assigned at random to experimenters. In all, 108 subjects were employed in the experiment. Data from 12 subjects were discarded due to experimenter error, resulting in useful data from 96 subjects, 48 from each school. All of the data were collected during a two week period in February, 1970.

Task

The paired associate list employed was devised specifically for the study. Primary requisites of the task were that it be simple enough to be administered comfortably within a thirty minute period and that it resemble the task of learning to read.

Preliminary work with pilot subjects indicated that a list of six items with eight learning trials was comfortably administered within a 30 minute period with adequate time for establishing rapport. It also allowed most subjects to attain mastery of the list on the final presentation, thus appearing to produce stability of scores.

To make the task resemble the process of learning to read, the decision was made to pair the visual representation of real words in a whimsical alphabet with the oral production of the word. The visual presentation was the stimulus and the oral production the solicited response.

The whimsical alphabet came from two sources. The partial alphabet devised by McKee (1966) for his Primer for Parents was chosen because it had the general characteristics of the English alphabet. Certain of the letters are similar to each other except for rotation; others require only minor changes to become different letters. Since the McKee alphabet did not have all 26 characters and bore no physical resemblance to the English alphabet, it was supplemented with Greek letters judged to bear least physical resemblance to the English alphabet.

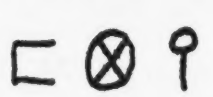
To make the task further resemble the process of learning to read, the list was made from English three letter words bearing minimal similarity to each other. These English words which made up the list were six phonetically spelled concrete nouns constructed from 15 letters of the alphabet. To help disguise the nature of the study, a point which is discussed later, the words were arranged in minimally similar pairs with the similarity systematically varied among the three pairs. The first pair were identical on the first letter, the second pair on the second letter, and the third pair on the third letter. Aside from these

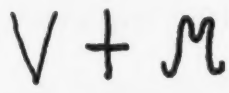
repetitions, no letter was used more than once. The words were written in the whimsical alphabet described, the letters of which had a one-to-one relationship with the letters of the English alphabet. The actual pairing of the stimuli and responses follows; they are arranged to show their similarity.

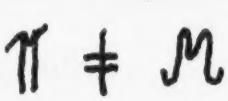
bed

bun

cat


ham


log


pig

Each of the experimenters was provided with a deck of six 3x5 cards, one card for each noun. The visual stimuli were hand printed in the center of one side of the cards, one word to a card, in symbols 1x1½ centimeters. On the reverse side of the cards were printed the oral responses which the experimenter was to give to the child along with the scheme which outlined the predetermined random order in which the cards were to be presented for each learning trial. Each card was laminated with plastic film to prevent smudges from acting as clues for learning.

Experimenters

Number of Experimenters

No clear guidelines could be found to determine the number of experimenters one should employ when studying experimenter variables. It seemed reasonable, therefore, to consider the number of experimenters employed in reported studies of experimenter effects. Stabler (1967) employed only two experimenters, one of either sex. This number did not seem adequate to rule out the influence of other factors. Binder, McConnell, and Sjoholm (1957), Sarason and Harmatz (1965), and Ferguson and Buss (1960) all reported data on effect of sex of experimenter on adult performance with but one experimenter of each sex. Stevenson and Odom (1963) employed two members of each sex in their experiment dealing with young children. Rosenthal, Friedman, and Kurland (1965) employed five members of each sex in their study of adults' ratings of success or failure depicted in photographs of people. Stevenson (1961) had six of each sex in his study of reinforcement with children and eight of each sex in his parallel study (Stevenson and Allen, 1964) with adults.

Other studies reflect the range reported above and the decision was made to stay within this range. Accordingly, six experimenters of each sex were employed for the study.

Background of Experimenters

The 12 experimenters were senior class education majors from Wisconsin State University at Whitewater. All were recruited from two courses within the education block and were scheduled to practice teach later in the same semester.

In recruiting the experimenters, class lists were obtained and names were chosen at random. After a brief explanation to the classes of the task to be used, the alleged purposes of the study, and the remuneration involved, the individuals were asked if they were willing to participate. Six males and one female declined before equal numbers of each sex committed themselves. Experimenters were paid two dollars per hour for their time and all served as experimenters during the month of February, 1970, finishing with the data collection one week before practice teaching began.

The experimenters appeared to be well motivated and to take the task seriously. They seemed pleased to be taking part in an educational experiment and most of them said that the experience was fun, rewarding, and valuable to their background as teachers. Although advised to collect data during their free time, at least five cut classes to work with subjects. The actual number may have been higher since this information reached the author by indirect and unsystematic means. Two male experimenters

evolved their own unique method of collecting data, obtained new subjects from the list of alternates, but refused to accept compensation for the time wrongly used. The principals of both schools were pleased with the interest the experimenters expressed in the subjects; their consensus was that the experimenters had a good command of testing techniques and acted in a professional manner.

Procedure

Training of Experimenters

In order to eliminate experimenter bias as a possible form of contamination of results, Rosenthal's (1966) "double-blind" design was employed, i.e., neither experimenter nor subject was told the true purpose of the experiment. Instead, experimenters were told that the purposes were (a) to study the types of clues children attend to when learning to read, and (b) to attempt to determine the role of meaningfulness in the acquisition of paired associates. The first alleged purpose was tied to the pattern of similarity of the words used in the study. The experimenters recorded errors made in responding to the stimuli with the belief that these errors would be analyzed. The second alleged purpose necessitated having experimenters record associations to each word after learning trials had been terminated. They were told that the number of associations to each word would be correlated with the number of correct responses for each word.

The training of all experimenters was conducted during a single one-hour session which consisted of a re-explanation of the alleged purposes of the study, an introduction to the materials being used, a demonstration of technique by the writer, and practice in administering the task. During the practice session, each experimenter had a chance to act as experimenter and as subject. The author monitored each experimenter and corrected mistakes, spending the final portion of the hour answering procedural questions that arose as a result of the practice.

The salient points made during this session were as follows: Each experimenter was to establish rapport with each subject and was to enter into the standardized portion of the task when he felt both he and the child were ready. After each subject had performed the task, the experimenters were to be sure that the subject felt good about his performance. The experimenters were told that each of them could reasonably expect to fail to adhere to standardized procedure with at least one child, and that the major concern was to obtain reliable data rather than to hold the cost of the study low. Therefore, the experimenters were encouraged to secure additional subjects rather than to try to patch up bad data. At the same time, they were asked to consider as normal a first grader who might need to walk around between trials, and were asked to deal with this in what they deemed to be the most reasonable fashion.

If such activity interrupted critical parts of their procedure, they were, however, asked to obtain data from another subject of the same grade and sex.

At the training session, each experimenter was assigned to one of the schools and given a list of eight subjects which included two boys and two girls selected randomly from each of the two grade levels. A list of alternates, also randomly chosen, was given to the secretary of each school. If a mistake in procedure were made or a child were absent, experimenters were asked to take the first unused subject from the proper category on the list of alternates. Three male and three female experimenters were assigned to each school.

It should be noted that no conditions were specified for establishing rapport, for reinforcement of correct responses, nor for the amount of time spent between trials. It was felt that too rigid constraints on the task might prevent sex-related personality variables, as well as non-sex-related personality variables, from affecting the learning of children, the very factors which were under consideration.

Presentation of Task

Testing conditions varied in the two schools. Lincoln school was the older of the two and filled to capacity. Testing at this school was done under circumstances which eliminated visual distractions, that is,

experimenter and subject were concealed behind screens in corners of hallways or behind screens in a classroom where other testing was being done. Washington school was a newer school, not quite filled to capacity, and had more nearly ideal testing conditions. Experimenters and subjects were able to interact in the privacy of an unused class or conference room.

Paired associate task.-After the experimenter had established rapport and read the prepared instructions for the task (see Appendix), he then presented the first stimulus card for four seconds; then he pronounced the word and allowed four more seconds to elapse before presentation of the next stimulus card. During this second four-second interval the subject repeated the word and studied the stimulus. After presentation of all six stimuli, the experimenter scrambled the cards according to the predetermined random order and repeated the presentations. For all presentations after the first, the subject was instructed to respond to the stimulus by saying the word, if he knew it, before the experimenter said it. The task continued for a maximum of nine presentations or two consecutive correct anticipations of the entire list.

Associations to words.- In accordance with the ostensible rationale for the study, the experimenters obtained one-word associations to each of the nouns employed in the study. One minute was allowed for associating

to each noun. Specific instructions read by the experimenter and a record form are found in the Appendix. Since the associations were not tabulated or analyzed in the present study, they are not discussed further.

Termination of task.- At the end of the two tasks which were required of each subject, the experimenters asked each child to keep a secret of the proceedings to help with the study of how children learn. They were told that such secrecy was necessary in order to insure that the learning which took place was a result of learning from the experimenter rather than from a fellow subject.

Supervision of experimenters.- The writer was present during two of the afternoons data were being collected in order to handle problems which arose but purposely avoided direct observation of experimenter and subjects in an effort to prevent further male interaction with subjects.

CHAPTER III

RESULTS AND DISCUSSION

The dependent variable under consideration is the number of correct responses made by each subject on a paired associate task in eight learning trials. This variable was analyzed to determine the effect of three independent variables, sex of experimenter, sex of subject, and grade placement of subject, in a four factor analysis of variance with the fourth factor, experimenter, nested in experimenter sex. The analysis was performed by the program MYBMDL, Version IV (Finn, 1968) on a Univac 1108 computer.

Four hypotheses were tested. Each hypothesis is restated, relevant data presented, and interpretation and discussion given. The hypotheses are presented in the order used in Chapter I.

Learning of Boys and Girls at Grade One and at Grade Five

Two separate hypotheses concerning the learning performance of boys and girls at the two grade levels were stated in Chapter I. They are:

1. At first grade level, girls' paired associate

learning will not be significantly different from boys' paired associate learning.

2. At fifth grade level, girls' paired associate learning will not be significantly different from boys' paired associate learning.

Test of hypotheses

The mean number of total correct responses made by first and fifth grade boys and girls on the paired associate task is presented in Table 2. The NYBMUL program did

TABLE 2

MEAN CORRECT RESPONSES
BY GRADE AND SEX OF SUBJECTS

	Grade		
Sex	1	5	Total
Girls	26.83	36.92	31.88
Boys	27.33	35.83	31.58
Total	27.08	36.38	

not yield separate analysis by sex of subject at each grade level, but the hypotheses can be tested by considering the analyses of grade of subject, sex of subject, and the interaction of these two factors.

As expected, sizeable differences between means of correct responses by first and fifth grade subjects are revealed. These differences, given in Table 3, are highly significant ($p. < .0001$). When grouped across grade levels, scores of boys and girls are not significantly different. The interaction of grade and sex is also non-significant,

TABLE 3

ANALYSIS OF VARIANCE OF GRADE, SEX,
AND GRADE x SEX OF SUBJECT

Source	df	MS	F	P <
Grade	1,48	2072.04	39.16	.0001
Sex	1,48	2.04	.04	.85
Grade x Sex	1,48	15.04	.28	.60

which indicates that the differences between the grades are considered to be consistent and equivalent for both sexes. Hypotheses 1 and 2 must therefore be accepted.

Discussion

Differences in reading ability favoring girls at first grade level were shown by the survey of related research to be a nearly universal finding. These findings are in seeming disagreement with the acceptance of the first hypothesis.

Important differences in the learning conditions must be pointed out. The first, and probably the most important, is that the subjects in this experiment were instructed on a one-to-one basis whereas usual reading instruction takes place in a classroom with as many as 30 children participating. Attention by subjects to extraneous stimuli was held at a minimum under individual testing and individual attention given by each experimenter was somewhat regulated.

A second factor which may account for this difference

is the length of time involved. Learning to read six word-like stimuli during a period of time not exceeding one-half hour and within eight presentations is not as taxing as the sustained act of reading instruction. However, for reasons which are discussed below, this factor is not felt to be the major cause of the discrepancy.

McNeil (1964) and Palardy (1969) report results which support the acceptance of the first hypothesis. The similarity of results seems to stem from the fact that the subjects as a group were given equal chances to participate in the learning act. When kindergarten boys in McNeil's study were given equal chance to respond via a programed multisensory auto-instructional device, their performance was superior to that of girls whereas their performance in first grade with instruction from typical female teachers fell behind that of girls. Feeling that boys' superior performance in kindergarten might be due to their liking of gadgets, McNeil's finding was that girls and boys expressed preference for the machine in equal numbers. In first grade, however, he found that the children perceived boys as the major recipients of negative comments by the teacher and that teachers generally ranked boys inferior to girls in ability to attend. All of this suggested to McNeil that boys' failure to achieve as well as girls in first grade reflected unequal opportunities to participate actively and positively in the learning situation.

Palardy (1969) found that boys achieved as well as girls in first grade when their teachers expected them to but less than girls when this was the expectation. Although it is difficult to argue a direct cause-effect relationship between expectation and action of the teacher, it is quite likely that different types of attention were given to boys as a result of differing expectations.

Both of these studies suggest that equal treatment, or at least equal chances to respond, will eliminate sex differences in achievement. Individual administration of the paired associate task in the present study is felt to have offered control for equal chances to respond on the learning task.

The non-significant differences at fifth grade were not unexpected. A preponderance of the analyses of learning patterns has indicated that boys and girls begin to evidence almost equal levels of academic growth in upper elementary school.

Sex of Experimenter

One hypothesis, the third of the present study, concerned the mean number of correct responses elicited by male and female experimenters. It was:

3. Sex of experimenter will have no significant effect upon the paired associate learning of boys and girls.

Test of hypothesis

The mean number of correct responses elicited by female experimenters was 32.5 whereas the number obtained by male experimenters was 30.96. The results of the analysis of variance of these factors are presented in Table 4.

TABLE 4

ANALYSIS OF VARIANCE BY SEX OF EXPERIMENTER

Source	df	MS	F	P
Sex of Experimenter	1,48	57.04	1.08	.30

The data support the acceptance of the null hypothesis. The sex of the experimenter has no significant effect upon the learning of first and fifth grade children.

Discussion

This finding was not unexpected. Consistent differences due to sex of experimenter are usually not found across age and sex levels of children or across all conditions in an experiment. Stevenson, Keen, and Knights (1963) found males to secure better performance on a marble dropping task from nursery age children under conditions of no reinforcement and females better able to increase the performance of their subjects by use of supportive statements. When results of no reinforcement and reinforcement conditions were combined, differences due to sex of adult were not significant. Stevenson (1961) found particular combinations

of sex of experimenter and sex of subject to be productive at certain of three age levels but found no overall differences due to sex of experimenter.

In the present study, however, the finding of no significant difference due to sex of experimenter persists when the sex of experimenter x sex of subject or sex of experimenter x grade of subject interactions are considered. The relevant mean response scores are given in Table 5; the results of the analysis of variance are presented in Table 6. These data will be discussed in the next section.

TABLE 5

MEAN CORRECT RESPONSES
BY SEX AND GRADE OF SUBJECT
AND SEX OF EXPERIMENTER

Sex of Experimenter	Grade		Sex of Subject	
	1	5	Girl	Boy
Females	27.17	37.83	32.96	32.04
Males	27.00	34.92	30.79	31.13

TABLE 6

ANALYSIS OF VARIANCE
OF SEX OF EXPERIMENTER x SEX OF SUBJECT
AND SEX OF EXPERIMENTER x GRADE OF SUBJECT INTERACTIONS

Source	df	MS	F	F
E Sex x Grade	1,48	45.38	.88	.36
E Sex x S Sex	1,48	9.38	.18	.68

Experimenter Sex by Grade by Subject Sex

The fourth hypothesis which was tested is as follows:

4. There will be no significant interaction between sex of subject and sex of experimenter at either first or fifth grade level.

Test of hypothesis

The mean correct responses relevant to this hypothesis are presented in Table 7. Although mean differences are

TABLE 7

MEAN CORRECT RESPONSES
BY EXPERIMENTER SEX, AND GRADE AND SEX OF SUBJECT

Experimenter Sex	First Grade		Fifth Grade	
	Girls	Boys	Girls	Boys
Females	28.25	26.08	37.67	38.00
Males	25.42	28.58	36.16	33.67

evident, the results of the analysis of variance, presented in Table 8, do not warrant rejection of the null hypothesis.

TABLE 8

ANALYSIS OF VARIANCE OF EXPERIMENTER
SEX x SUBJECT SEX x SUBJECT GRADE LEVEL

Source	df	MS	F	P
Sex x Sex x Grade	1,48	100.04	1.89	.18

Discussion

Several explanations seem plausible in accounting for this non-significant finding. One consideration is the wide variance produced by the range of scores that was

obtained. The lowest score obtained out of a possible 48 was an 8, the highest a 48. Mean scores elicited by individual experimenters varied from 23.25 to 36.13 for the males and from 25.13 to 36.63 for the females.

Rosenthal (1966) suggested a second source for a type II error. Although he insisted that a double-blind design is necessary to prevent experimenter expectancy from biasing results in the direction expected, thereby confirming expected hypotheses, he has provided a hypothetical example wherein an experimenter is ignorant of the hypothesis under study and influences the results in such a way as to force acceptance of a null hypothesis. The situation posed by Rosenthal is paraphrased below.

An experimenter was unaware of the null hypothesis that subjects exposed to an anxiety-arousing experience immediately before testing would not score differently on an intelligence test than those not so exposed. The experimenter, however, had a private hypothesis that tall, thin people are unusually bright. Of the 10 people to whom he administered the intelligence test, one person from each treatment group was tall and thin. Unconsciously, he treated these people differently and was more lenient in scoring their tests, thus allowing both thin people five points higher than their actual intelligence quotient. This amount of increased variance was demonstrated to cause the acceptance of the null hypothesis which would

otherwise have been rejected.

The parallel may or may not exist. However, with 12 experimenters, each testing only eight subjects, the possibility exists that the private hypotheses of each experimenter could affect his results in a significant direction.

Another possible source of a type II error has been suggested by Ingraham and Harrington (1966) whose principal finding was that expectancy effects of the experimenter diminish with increased training and experience. Rather than the usual single hour training session for working with rats, their experimenters received six hours of training. Using the usual rat population randomly assigned to bright and dull groups and the instructions to the experimenters that they wanted to check the accuracy of the genetic description, results confirming the expectancy were present on the first day, but had disappeared by the fifth day of work with the rats.

This suggests that experimenters with more training and more experience may have obtained different results than were obtained here. Rosenthal (1966), however, has suggested that the experienced experimenter is more susceptible to biasing errors than is the less experienced. His statement became, therefore, that many experimenters, each with only a few subjects to test, are better than only a few experimenters testing the same total population.

However, there are no data upon which the acceptance of the above null hypothesis can be refuted, and the possibility of a type II error must only be acknowledged.

The failure to obtain any significant interactions between sex of experimenter and sex or age of subject is at apparent conflict with the results of experiments by Stevenson (1961) and Stevenson, Keen, and Knights (1963) in which certain combinations of sex of experimenter and sex and/or age of subject were more productive than other combinations. The conflict of results, however, is felt to be more apparent than real, due to differences in design.

First of all, it must be remembered that no detailed directions were established for the experimenters in this study on types of interpersonal relationships between experimenter and subject. The only specific instruction given was that each subject was to be made to feel that he had done an adequate job when the tasks were terminated. This contrasts to the experiments cited above in which the interaction between experimenter and subject was rigidly defined. Not only were the roles rigidly defined but the exact wording of the supportive statements were predetermined along with the timed intervals during which the statements were made. This did not allow the individual experimenters to treat the subjects as individuals, to meet the felt needs of each subject. Since the nature of interaction between trials or even within the confines

of the timed presentation was not specified in the present study, experimenters were able to meet the needs of each subject as they arose. This may have accounted for the lack of significant interaction by sex, and made the situation more humanistic, more like the type of interaction which might ideally be expected to occur between teacher and child.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary and Conclusions

The incidence of sex differences in learning rates of elementary age children has been documented in the United States since 1909 (Ayres, 1909). Sex differences in ability to read have been documented since 1932 (St. John, 1932). From before the time of Ayres until the present, it has been popular to link the comparative deficiency of boys with the sex of the teacher, and charge, as St. John did, that a maladjustment exists between predominantly female teachers and the young males in their classrooms. The implication of this charge is that male teachers would foster the academic growth of elementary school age boys. Laboratory studies have not determined whether the sex of the experimenter has any effect on the learning of pupils in elementary school.

Therefore, the present experiment was designed to determine the effect of the sex of the teacher/experimenter on the learning of a reading-like paired associate task by children in elementary school. Specifically, answers to the following questions were sought: (a) Will learning performance of boys and girls differ at either first grade or fifth grade?

(b) Will the sex of the experimenter be a significant variable in the learning of boys and girls? (c) Will the sex of the experimenter interact with the sex of the subjects at either first or fifth grade?

A double-blind experiment was designed to answer these questions. Neither the subjects nor the experimenters were told the reason for the study. Subjects were merely told that they were helping educators find out how boys and girls learn to read. The experimenters were given two reasons for the study: (a) to determine the types of clues children use in learning to read, and (b) to determine the role of meaningfulness in learning to read.

The task was developed to resemble insofar as possible the process of learning to read. Three pairs of phonetically regular, minimally similar three letter concrete nouns were chosen as the basis for the task. These words were spelled from only fifteen letters of the alphabet. The letters which were shared by the words followed a specific pattern - the first pair shared the first letter, the second pair the second letter, and the third pair the third letter. The words were written in letters from a whimsical alphabet on separate 3x5 cards which were presented one at a time to the subjects and paired with the oral production of the word in the customary anticipatory method of presenting paired associate tasks. Cards were scrambled after each presentation according to a predetermined random order and were presented for eight

learning trials.

Six male and six female students, all of whom were seniors majoring in education at Wisconsin State University in Whitewater, were employed as experimenters. They were selected randomly from class lists in two eduation classes and were offered two dollars per hour to participate in the study. All experimenters were trained during a single one hour session. Each experimenter was assigned eight subjects, two boys and two girls at each of the two grade levels, who were chosen randomly from the two public elementary schools within the city limits of Whitewater, Wisconsin.

The dependent variable was the number of correct responses out of a possible 48 on the paired associate task. These data were analyzed by analysis of variance. A significant difference was found between the different learning rates of first and fifth grade subjects, but no significant differences were found (a) between boys and girls in first grade, (b) between boys and girls in fifth grade, (c) due to experimenter sex, or (d) in the three way interaction of sex of experimenter, sex of subject, and grade of subject. It must therefore be concluded that the sex of the experimenter had no significant effect on the learning of the first and fifth grade subjects.

Implications

Implications for Further Research

The findings of this study indicate that the sex of the experimenter/teacher does not affect the learning performance of elementary school age children learning to read word-like stimuli in a one-to-one situation. However, the results may not generalize to group instruction where the attention of each child is not so explicitly demanded nor so nearly equal treatment by the teacher assured. In lieu of first grade classrooms taught by male teachers, a similar task might be constructed and presented to groups by male and female experimenters.

The results of the present experiment were obtained from a group of undifferentiated middle class elementary school pupils and generalizations can be inferred only to a similar population. The effect of the sex of the experimenter/teacher upon the learning of a group of known poor readers is not known and has yet to be determined.

Implications for Teaching Reading

The task was designed intentionally to involve, insofar as possible, the process of learning to read. Phonetically spelled words were reproduced in a whimsical alphabet and paired with the oral production of the word. The resulting procedure was that the child attempted to learn to read word-like stimuli to the experimenter.

The very factors, however, which allowed the investigation of sex interactions at the two grade levels in this study account for its limitations. The learning process

was not sustained and for this reason cannot be generalized without reservation to classroom teaching. Although the paired associate task resembled, as much as possible, the process of learning to read, several differences must be considered: (a) there were but six words; (b) these words were never presented in continuous text; (c) although pairs of words were minimally similar - each word having one letter in common with one other word - there were no other similarities as might be found in such words as three and there; and (d) the subjects and experimenters interacted on a one-to-one basis which was felt to maximize individual performance. With these limitations in mind, the following implications are made.

The results of this study imply that the sex of the teacher should not significantly affect the academic performance of pupils, whether in the primary or intermediate grades. Further, the implication is that boys should be able to learn as efficiently as girls regardless of the sex of the teacher if equal opportunities to participate in the learning experience are provided.

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APPENDIX

Pupil_____Grade_____Sex_____Examiner_____

Introduction to task:

I am going to school just as you are - I have teachers, get report cards and get grades, but I also get to work with children instead of only working with books. Many of us are trying to see if we can find out how children learn to read by actually working with children, and we would like to have you help us by learning to read some words for us.

I have six cards here with words printed on them in a made-up alphabet, not the letters you are used to. I am going to show you one card at a time and let you look at it carefully for a short time. Then I will say the word. After I have said it you are to repeat it and try to remember what the word is. I will then do the same thing with the next card. Remember: Look at the word carefully, listen as I say it, repeat it, and try to remember what the word says. (Clarify as needed)

After first presentation:

This time we are going to do the same thing except that I want you to try to say the word before I say it. I will wait for a little while before saying the word, you should say the word again even if you got it right. The steps are: Look carefully at the word, try to say it, listen to me say it, repeat what I say, and try to remember what it is. (Clarify as needed)

RECORD OF RESPONSES

BED								
BUN								
CAT								
HAM								
LOG								
PIG								

Correct answer = +
No answer = -
Wrong answer = (Write in actual incorrect answer)

Instructions to be read for ASSOCIATIONS:

I want you to tell me what the words I'm going to give you make you think of. For example, "day" makes me think of noon, light, working, and many other things, but it would be wrong if I would say that "day" reminds me of night, dark, moon, and so on because "dark" and "moon" tell about "night" instead of about "day". When I say a word, you tell me what words you can think of - as many as you can, but be sure you are always thinking of the word I gave you. (Clarify as needed)

Associations (indication of meaning)

Record the responses of each child to the following questions (allow one minute per word):

1. What does "bed" make you think of?

2. What does "bun" make you think of?

3. What does "cat" make you think of?

4. What does "ham" make you think of?

5. What does "log" make you think of?

6. What does "pig" make you think of?

After associations have been obtained:

Now I want to ask you one more favor. Can you keep a secret of what we did until the end of the week? Please don't tell any of your friends here at school what we did until after next Friday. If the other kids find out what we did here, we won't be able to find out how they will learn since we want them to learn from us and not from you.

Thank you.